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DISABLING ILLNESS AMONG INDUSTRIAL EMPLOYEES IN 1935 AS COMPARED WITH EARLIER YEARS

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This is a continuation of former reports [1] on the average frequency of new cases of sickness and nonindustrial accidents causing absence from work for more than 1 week, among members of a group of about 33 industrial sick-benefit associations and company relief departments reporting periodically to the United States Public Health Service.

As pointed out in previous reports, the reporting establishments are located east of the Mississippi and north of the Ohio and Potomac Rivers.

This report covers the experience for the year 1935 as compared with the 5-preceding years. The incidence or frequency rate is the ratio of the number of cases which began during the year to the number of years of membership, or, in other words, the average annual number of cases per 1,000 men expressed in terms of number of cases per 1,000 years of life under observation. None of the reports includes industrial accidents.

The rates presented in the tables are probably understatements of the frequency of sickness and nonindustrial accidents which render employees unable to work for 8 consecutive days or longer, because benefits are usually refused for disability on account of the venereal diseases, for illness resulting from the violation of any civil law, for the results of willful or gross negligence, and for certain other causes. Since these provisions existed throughout the years under comparison, the frequency rates are comparable.

The tables cover two groups of establishments. Group A is composed of all associations and companies which reported in the specific year regardless of whether they continued to report throughout the 5 years. Group B is composed of the 23 establishments which reported throughout the 6 years ending December 31, 1935.

DISABILITY AMONG MALE EMPLOYEES IN YEAR 1935 COMPARED WITH PRECEDING YEARS

In 1935, according to table 1, the frequency rates for sickness and nonindustrial accidents causing disability for 8 consecutive calendar days or longer were 85.1 and 82.6 cases per 1,000 men among group A and group B, respectively. The rates for 1935 are approximately

[1] For the record 1921 to 1929, inclusive, see Public Health Reports, vol. 47, no. 18, Apr. 29, 1932, pp. 995-1001.

9 percent higher than the rates for 1934, and 4 percent higher than for 1933. However, the rates in 1935 were not as great as the corresponding rates in 1930, 1931, and 1932. In spite of the increase over the low rates in 1933 and 1934, the incidence rate in 1935 was about 5 percent below the average for the years 1930–34.

TABLE 1.—*Frequency of specified causes of disability lasting 8 consecutive calendar days or longer among male industrial workers in various industries, by years, from 1930 to 1935, inclusive* [1] *(annual number per 1,000 men)*

Year in which disability began	Sickness and non-industrial injuries [2]		Sickness		Respiratory diseases [3]		Sickness exclusive of influenza		Nonrespiratory diseases		Average number of men, all reporting establishments
	A	B	A	B	A	B	A	B	A	B	
1930	94.1	94.7	81.8	82.9	32.0	32.6	68.5	69.5	49.8	50.3	188,714
1931	94.6	94.0	82.2	82.2	34.9	35.2	63.3	62.9	47.3	47.0	171,694
1932	97.5	95.3	84.9	83.5	37.6	37.3	62.9	61.5	47.3	46.2	163,979
1933	82.3	78.8	71.0	68.5	28.6	26.8	55.7	54.6	42.4	41.7	152,203
1934	78.1	76.3	65.8	64.4	24.5	24.0	55.7	54.2	41.3	40.4	174,643
1935	85.1	82.6	73.9	71.5	29.3	28.2	61.2	59.3	44.6	43.3	157,959
5 preceding years [4]	89.3	87.8	77.1	76.3	31.5	31.2	61.2	60.5	45.6	45.1	170,247

A=all reporting establishments; B=establishments which reported throughout the 6 years ending Dec. 31, 1935.

[1] For the record 1921 to 1929, inclusive, see Public Health Reports, vol. 47, no. 18, Apr. 29, 1932, pp. 995–1001.
[2] Industrial accidents, venereal diseases, and a few numerically unimportant causes of disability are not reported.
[3] Title numbers 11, 23, 104–115a, in the International List of the Causes of Death, fourth revision, Paris, 1929.
[4] 1930 to 1934, inclusive.

The rates for sickness, respiratory diseases, sickness exclusive of influenza, and nonrespiratory diseases, respectively, in 1935, as compared with former years, for groups A and B, showed relatively the same percentage increase. In each group the 1935 rates exceeded the rates for 1934 and 1933, but were below each of the first 3 years under consideration. The increase in frequency rates apparently was not due to any one particular disease group, but to a general increase in disability.

TREND IN THE FREQUENCY OF RESPIRATORY DISEASES AMONG MALE EMPLOYEES

Of particular interest is the frequency of cases of influenza or grippe. (See table 2.) The frequency of influenza in 1935 was lower than in 1933 and the preceding years under comparison; it was 20 to 23 percent below the average rate for the 5-year period, this decrease being relatively greater than for any other disease or disease group.

TABLE 2.—*Frequency of specified respiratory diseases which caused disability for 8 consecutive calendar days or longer among male industrial workers in various industries, by years, from 1930 to 1935, inclusive* [1] *(annual number per 1,000 men)*

Year in which disability began	Influenza or grippe (11)		Bronchitis, acute and chronic (106)		Diseases of the pharynx and tonsils (115a)		Pneumonia, all forms (107–109)		Tuberculosis of the respiratory system (23)		Other diseases of the respiratory system (104–105) (110–114)	
	A	B	A	B	A	B	A	B	A	B	A	B
1930	13.3	13.4	4.6	5.0	6.0	5.7	2.5	2.7	1.1	1.1	4.5	4.7
1931	18.9	19.3	3.6	3.8	5.2	5.1	2.1	2.1	1.0	1.0	4.1	3.9
1932	22.0	22.0	3.6	3.7	4.5	4.4	2.0	1.9	1.0	1.0	4.5	4.3
1933	15.3	13.9	2.9	2.8	3.9	3.6	1.8	1.7	.8	.9	3.9	3.9
1934	10.1	10.2	3.2	3.2	4.3	3.8	2.0	2.1	.8	.8	4.1	3.9
1935	12.7	12.2	3.6	3.6	5.1	4.8	2.3	2.2	1.0	1.0	4.6	4.4
5 preceding years	15.9	15.8	3.6	3.7	4.8	4.5	2.1	2.1	.9	.9	4.2	4.2

[1] For the record 1921 to 1929, inclusive, see Public Health Reports, vol. 47, no. 18, Apr. 29, 1932, pp. 995–1001.

A=All reporting establishments; B=establishments which reported throughout the 6 years ending Dec. 31, 1935.

Numbers shown in parentheses are disease title numbers from the International List of the Causes of Death, fourth revision, Paris, 1929.

The frequency of bronchitis (acute and chronic) in 1935 as compared with the preceding 5-year period was the same in group A and approximately the same in group B. However, in 1935 the rates were greater than in the 2 immediately preceding years. The rates for diseases of the pharynx and tonsils, pneumonia (all forms), and "other diseases of the respiratory system" not only exceeded the rates for the preceding 3 years, but also exceeded the average for the 5-year period. Mortality from pneumonia also increased in the industrial population of the country during 1935 as compared with 1934.[2] The rate of 2.3 new cases of pneumonia per 1,000 men is the highest observed for any year since 1930, when pneumonia occurred at the rate of 2.5 cases annually per 1,000 men.

The frequency of new cases of tuberculosis of the respiratory system was about the same as the 5-year average (1930–34).

TREND IN THE FREQUENCY OF DIGESTIVE DISEASES AMONG MALE EMPLOYEES

As shown in table 3, the diseases of the digestive system as a whole occurred at a slightly higher incidence level in 1935 than during the preceding 2 years. However, the rates 12.9 for group A and 12.5 for group B per 1,000 males in 1935 were somewhat lower than the corresponding rates for 1930, 1931, and 1932. In fact, with the exception of 1930, the rates for all digestive diseases show very little variation from year to year. The only subgroup of these diseases which showed rates in 1935 above the average for the preceding 5-year period was appendicitis. The frequency of appendicitis was

[2] Metropolitan Bulletin, Metropolitan Life Insurance Co., New Yok, vol, 17, no. 1, January 1936, p. 11

practically the same in 1935 as in 1934; however, a decrease in fatal appendicitis cases during 1935 is reported by the Metropolitan Life Insurance Co.

TABLE 3.—*Frequency of specified diseases of the digestive system which caused disability for 8 consecutive calendar days or longer among male industrial workers in various industries, by years, from 1930 to 1935, inclusive* [1] *(annual number per 1,000 men)*

Year in which disability began	Digestive diseases total (115b–129)		Diseases of the stomach except cancer (117–118)		Diarrhea and enteritis (120)		Appendicitis (121)		Hernia (122a)		Other digestive diseases (115b, 116, 122b–129)	
	A	B	A	B	A	B	A	B	A	B	A	B
1930	14.8	14.5	4.7	4.9	1.5	1.4	4.0	3.7	1.7	1.7	2.9	2.8
1931	13.4	13.1	4.0	3.8	1.2	1.1	3.7	3.6	1.8	1.8	2.7	2.8
1932	13.3	12.7	4.0	3.7	1.0	1.0	3.4	3.5	1.9	1.8	3.0	2.7
1933	12.1	11.3	3.3	3.4	1.0	1.0	3.3	3.2	1.3	1.3	3.2	2.4
1934	12.7	12.5	3.2	3.5	1.3	1.1	3.9	4.0	1.5	1.4	2.8	2.5
1935	12.9	12.5	3.6	3.6	1.1	1.0	4.0	3.9	1.4	1.4	2.8	2.6
5 preceding years	13.2	12.8	3.8	3.9	1.2	1.1	3.7	3.6	1.6	1.6	2.9	2.6

[1] For the record 1921 to 1929, inclusive, see Public Health Reports, vol. 47, no. 18, Apr. 29, 1932, pp. 995–1001.

A=All reporting establishments; B=establishments which reported throughout the 6 years ending Dec. 31, 1935.

Numbers in parentheses are disease title numbers from the International List of the Causes of Death, fourth revision, Paris, 1929.

TRENDS IN THE FREQUENCY OF NONRESPIRATORY, NONDIGESTIVE DISEASES AMONG MALE EMPLOYEES

In 1935 the frequency of nonrespiratory, nondigestive diseases was somewhat below the average for the 5 preceding years. The frequencies of 31.7 cases per 1,000 males for group A and of 30.8 for group B were lower than the respective rates for 1930, 1931, and 1932, but greater than the rates for 1933 and 1934.

Within this very broad class of diseases, however, certain subgroups showed rates which were not above those for any preceding year under consideration. Definite improvement appears to have occurred during the past 5 or 6 years in the number of new cases of rheumatism (acute and chronic) per 1,000 men, and in the rate of new cases of diseases of the organs of locomotion.

On the other hand, the incidence of diseases of the circulatory system except diseases of the veins duplicated in 1935 the high rate attained in 1932. Diseases of the heart appear to be largely responsible for the unfavorable rate for diseases of the circulatory system. (See table 4.)

TABLE 4.—*Frequency of specified nonrespiratory, nondigestive diseases which caused disability for 8 consecutive calendar days or longer among male industrial workers in various industries, by years, from 1930 to 1935, inclusive*[1] *(annual number per 1,000 men)*

Year in which disability began	Nonrespiratory, nondigestive diseases total		Diseases of the circulatory system except diseases of the veins (90–99) (101–103)		Diseases of the veins (100)		Diseases of the heart (90–95)		Nephritis, acute and chronic (130–132)	
	A	B	A	B	A	B	A	B	A	B
1930	35.0	35.8	3.4	3.6	1.6	1.7	2.1	2.3	0.7	0.8
1931	33.9	33.9	3.2	3.4	1.8	1.6	2.0	2.2	.7	.7
1932	34.0	33.5	3.7	3.9	1.8	1.7	2.5	2.7	.8	.7
1933	30.3	30.4	3.4	3.3	1.4	1.4	2.1	2.2	.5	.6
1934	28.6	27.9	3.0	3.0	1.5	1.4	2.0	2.0	.5	.6
1935	31.7	30.8	3.7	3.6	1.5	1.4	2.4	2.4	.5	.5
5 preceding years	32.4	32.3	3.4	3.4	1.6	1.6	2.1	2.3	.7	.7

Year in which disability began	Other diseases of the genito-urinary system and annexa (133–138)		Neuralgia, neuritis, sciatica (87a)		Neurasthenia and the like (87b)		Other diseases of the nervous system (78–85)		Diseases of the organs of vision (88)	
	A	B	A	B	A	B	A	B	A	B
1930	2.4	2.3	2.3	2.3	1.2	1.3	1.0	1.1	1.1	1.1
1931	2.3	2.3	2.1	2.1	1.5	1.5	1.1	1.3	1.0	.9
1932	2.3	2.3	2.3	2.5	1.3	1.2	1.2	1.3	.9	.8
1933	2.2	2.2	2.1	2.0	.8	.8	1.4	1.3	.8	.9
1934	2.4	2.1	1.8	1.8	.8	.7	1.4	1.1	.8	.7
1935	2.7	2.5	2.3	2.3	1.2	1.0	1.3	1.2	.8	.8
5 preceding years	2.3	2.2	2.1	2.1	1.1	1.1	1.2	1.2	.9	.9

TABLE 4.—*Frequency of specified nonrespiratory, nondigestive diseases which caused disability for 8 consecutive calendar days or longer among male industrial workers in various industries, by years, from 1930 to 1935, inclusive* [1] *(annual number per 1,000 men)*—Continued

Year in which disability began	Diseases of the ears and of the mastoid process (89)		Rheumatism, acute and chronic (56–57)		Diseases of the organs of locomotion except diseases of the joints (156b)		Diseases of the skin (151–153)		Infectious and parasitic diseases [2] (1–10, 12–22, 24–33, 36–44)	
	A	B	A	B	A	B	A	B	A	B
1930	0.5	0.5	5.6	5.8	3.5	3.6	3.8	4.0	3.8	3.5
1931	.7	.6	5.4	5.4	3.3	3.6	3.2	3.2	3.3	2.9
1932	.7	.6	5.3	5.4	3.3	3.7	2.7	2.7	2.7	2.1
1933	.6	.6	4.9	5.0	2.8	3.0	2.7	2.7	2.0	1.9
1934	.5	.5	4.0	4.0	2.7	2.9	2.5	2.4	2.5	2.5
1935	.6	.5	4.0	4.0	2.7	2.8	2.7	2.7	3.0	2.8
5 preceding years	.6	.6	5.1	5.1	3.1	3.4	3.0	3.0	2.9	2.6

Year in which disability began	Cancer, all forms (45–53)		Other general diseases [3] (54, 55, 59, 77)		Diseases of the bones and joints (154–156a)		Ill-defined and unknown causes of disability (200)		Nonindustrial injuries (163–198)	
	A	B	A	B	A	B	A	B	A	B
1930	0.5	0.5	1.2	1.1	0.7	0.7	1.7	1.9	12.3	11.8
1931	.6	.6	1.2	1.2	.6	.5	1.9	2.1	12.4	11.8
1932	.6	.6	1.7	1.7	.4	.4	2.3	1.9	12.6	11.8
1933	.5	.5	1.7	1.7	.5	.4	2.0	2.1	11.3	10.3
1934	.4	.4	1.9	1.9	.4	.3	1.5	1.6	12.3	11.9
1935	.5	.5	1.7	1.6	.5	.5	2.0	2.1	11.2	11.1
5 preceding years	.5	.5	1.5	1.5	.5	.5	1.9	1.9	12.2	11.5

[1] For the record 1921 to 1929, inclusive, see Public Health Reports, vol. 47, no. 18, Apr. 29, 1932, pp. 995–1001.
[2] Except influenza, respiratory tuberculosis, and the venereal diseases.
[3] Includes nutritional diseases, diseases of the endocrine glands, diseases of the blood and blood-making organs, chronic poisonings, and intoxications.

A=All reporting establishments; B=establishments which reported throughout the 6 years ending Dec. 31, 1935.

Numbers shown in parentheses are disease title numbers from the International List of the Causes of Death, fourth revision, Paris, 1929.

The year-to-year change in the incidence of other subgroups of nonrespiratory, nondigestive diseases may be seen in table 4.

FREQUENCY OF DISABILITY AMONG FEMALE EMPLOYEES IN 1935 AS COMPARED WITH FORMER YEARS

Table 5 shows the frequency rate of sickness and nonindustrial accidents for female industrial workers during 1935 as compared with former years, and with the male rate for each corresponding year.

Since the reporting establishments upon which this report is based employ approximately only 15,000 female workers, the rates for the broad disease groups alone are shown.

Since most of the reporting associations pay no benefits for disabilities connected with diseases of pregnancy, childbirth, and the puerperal state, and since the age distribution of the female group is

more favorable than that of the males, the ratio of the female rate to the male rate gives a rough approximation of the relation of sex to the incidence of disability.

TABLE 5.—*Frequency of specified causes of disability lasting 8 consecutive calendar days or longer among female industrial workers in various industries, by years, from 1930 to 1935, inclusive*

Year in which disability began	Sickness and nonindustrial injuries [1]	Percent of male rate	Sickness	Respiratory diseases [2]	Sickness exclusive of influenza	Nonrespiratory diseases	Nonindustrial injuries	Average number of women, all reporting establishments
1930	145.3	154	132.5	49.8	117.1	82.7	12.8	13,582
1931	162.0	171	147.8	63.9	115.5	83.9	14.2	12,272
1932	158.4	162	143.6	71.6	101.1	72.0	14.8	13,520
1933	131.3	160	119.5	51.3	91.4	68.2	11.8	14,587
1934	143.6	184	131.1	52.9	108.2	78.2	12.5	15,644
1935	144.9	170	130.7	50.4	108.2	80.3	14.2	15,049
5 preceding years [3]	148.1	166	134.9	57.9	106.7	77.0	13.2	13,921

[1] Industrial accidents, venereal diseases, and a few numerically unimportant causes of disability are not reported.
[2] Title numbers 11, 23, 104–115a, in the International List of the Causes of Death, fourth revision, Paris, 1929.
[3] 1930 to 1934, inclusive.

In 1935 among the female members of the reporting benefit associations the annual frequency of cases of sickness and nonindustrial accidents causing disability for 8 calendar days or longer was 144.9 cases per 1,000 females. This rate slightly exceeded the rates for 1933 and 1934, but was about 2 percent below the average rate for the 5-year period, 1930–34.

Sickness exclusive of influenza in 1935 among the female employees occurred at the same rate as in 1934. The frequency of 108.2 cases was greater than the average rate for the 5 preceding years. With the exception of 1932 and 1933, when the rates dropped sharply, the nonrespiratory diseases as a whole have shown relatively little change during the 6 years under comparison.

The incidence of disability caused by nonindustrial accidents among the females slightly exceeded the rate among males; in fact, sex was less related to this kind of disability than to any other lasting 8 days or longer.

It was found that for all sickness and nonindustrial accidents the females were absent 8 consecutive days or longer from 54 to 84 percent oftener than the males. The excess of 70 percent in 1935 as compared with 66 percent indicates that the average incidence of disability among the female employees as compared with the males in the same establishments was somewhat greater in 1935 than during the 5 preceding years as a whole.

SUMMARY

1. The annual number of cases of sickness and nonindustrial accidents lasting 8 calendar days or longer among approximately 158,000 male industrial employees was higher in 1935 than in 1933 or 1934, but lower than for the years 1930, 1931, or 1932.

2. The increase in the frequency of disability in 1935 as compared with 1933 and 1934 was not due to one particular disease or disease group.

3. An important disease group which showed rates in 1935 *above* the average for the *preceding 5-year period as well as for 1934* was the group of diseases of the circulatory system, which included diseases of the heart but was exclusive of diseases of the veins.

4. An important disease which showed rates *below* the average for the preceding 5-year period but *above* the rate for 1934 was influenza or grippe. A favorable trend is indicated in the frequency of rheumatism (acute and chronic) and in diseases of the organs of locomotion.

5. Several disease groups of interest to industrial hygienists showed very little change during the past 6 years.

6. The frequency of cases of sickness and nonindustrial accidents causing disability for more than 1 week among approximately 15,000 female industrial workers was 144.9 in 1935, as compared with 148.1 in the 5 preceding years as a whole.

TOXICITY OF FRUIT SPRAYS

A Study of Lead Spray Residues in Iowa-Grown Fruit, with Reference to Manifestations in Consumers

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INTRODUCTION

The regulations applicable to sprayed fruits and vegetables intended for interstate commerce do not afford protection against spray residues on such articles of diet distributed in intrastate commerce. As a consequence, State control appears to be necessary, although as yet only a few States have adopted regulatory measures. State measures thus far have consisted of a cooperative plan with the Federal chemists and field analysts (as is in effect in the States of Washington and Maryland) or the enactment of State laws which give the State department of health the power to enforce regulations for spray amounts. Only two States, Colorado and Michigan, have so far passed laws of this type. Geagley (*1*), discussing the need for State control of spray residues, says:

It is pertinent to point out that a survey made in several States of programs in force for the control of spray residue will show willful lack of appreciation as well as of definite action and policies along control lines.

Iowa has established no spray residue regulations and has done only a very limited amount of investigation as to actual lead loads carried on products grown within the State. While many of the apples grown in Iowa are grown by small-scale producers and are intended for the growers' own consumption, there are also orchards in all districts of the State where apples are grown commercially. It is the general practice among this latter group of producers to spray their crops. The usual number of sprayings required is not more than three, as the incidence of the codling moth is found to be lower here than in many States (*2*). Illinois, neighboring Iowa on the east, requires more frequent sprayings, especially in the southern and central portions of the State (*3*). The Iowa spray schedule generally followed sets the third (and as mentioned above usually the last) spray date for the first week in June. In States where heavier spraying is required, the schedule is extended later into the summer, and the fruit, being larger, thus receives a relatively greater amount of spray. Furthermore, early sprays may be expected to be removed from the fruit, at least in part, by the rains of May and early June.

CASE OF ARSENIC DERMATITIS FROM EATING UNWASHED SPRAYED APPLES

Notwithstanding these conditions of light spraying, Iowa-grown apples as they appear on the market frequently show a definite coating upon them which strongly suggests spray residues. That poisoning has resulted from the ingestion of even small numbers of unwashed sprayed apples has been definitely demonstrated. The following summary of a case of arsenic dermatitis treated at the University Hospital may be cited here:

Case report.—The patient, T. E. M., male, aged 26, while on a vacation trip, ate three apples which he had picked from a roadside orchard. He stated that they were covered with a whitish spray substance which he partially removed with a handkerchief. On the following day diarrhea occurred, with 7 stools, and continued for a second day, with 4 stools. These stools were brown in color and contained mucus, but showed no gross evidence of blood. With the disappearance of the diarrhea, an anal itching developed which persisted to the time of admission to the hospital on the twenty-second day following ingestion of the fruit. Four days subsequent to the occurrence of the pruritis, a dermatitis appeared in the same area. It spread rapidly to include the entire buttocks, was urticarial in character, and showed an elevated margin. Proctoscopy at the time of admission to the hospital was negative. Two days following admission, an itching maculo-papular rash appeared in the lumbar region and within 24 hours extended to include the entire trunk and extremities. At this time the temperature dropped to a subnormal level. Two days later the rash began to fade and the patient started an uneventful recovery. Pulse and respiration at no time varied much

from normal. Arsenic was found in the urine on the day following admission. None was contained in the patient's hair. On the same day blood studies revealed 85 percent hemoglobin, a red count of 4,830,000, and a white count of 6,900, with 61 percent neutrophiles, 8 percent eosinophiles, and 30 percent lymphocytes.

In addition to an occasional clinical case as cited above, it appeared that there might possibly be a greater incidence of subclinical manifestations among those who regularly use sprayed products, especially in those who do not trouble to remove the residues by washing. In Iowa the commercial apple crop is the crop which is most regularly sprayed. Therefore it has seemed of interest to us to ascertain (1) whether Iowa-grown apples carry amounts of sprays above or below interstate commerce allowances and (2) whether the ingestion of these apples over a period of months will cause clinical or subclinical manifestations of toxicity.

EXPERIMENTAL

A. DETERMINATION OF LEAD CONTENT OF APPLES

For this study apples from the following sources were used: (1) Sprayed apples from six east-central Iowa orchards scattered over a radius of about 50 miles surrounding Iowa City; (2) nonsprayed apples from the same territory used as controls for natural lead content; and (3) imported acid-washed sprayed apples.

Tests were made for lead content rather than for arsenic, or for both lead and arsenic, since, as has been pointed out by Frisbie (*4*), "a sample which complies with the tolerance for lead will be well within the limit for arsenic, except, of course, in those unusual instances when such insecticides as calcium arsenate are used." For lead loads on the surface of the apples the diphenylthiocarbazone colorimetric test was used as recommended by the United States Department of Agriculture (*5*). For determinations of lead contents of cores and flesh the materials were prepared and ashed according to the method used by Kehoe, Thamann, and Cholak (*6*), after which the procedure was the same as for surface lead load studies.

Care was taken to see that the reagents used were free from lead and arsenic. Since experience has shown that 1,400-gram specimens were the most practical for getting representative lots of fruit and for determinations which were not too low to be read with certainty, these amounts were used. For tests of surface lead loads the stem and calyx ends of the apples were first removed and placed in the funnel in which the apples were rinsed after having been subjected to the sodium oleate wash solution. In some instances tests were made using the whole apple, while in others skins, flesh, and cores were tested separately to ascertain their individual lead loads. The test preparations were matched colorimetrically with known standard lead values and readings were made on the basis of number of grains of lead per pound of fruit.

B. DETERMINATION OF POSSIBLE CHANGES IN RED BLOOD CORPUSCLES DUE TO TOXIC EFFECTS OF INGESTED LEAD

Formerly blood tests for detection of the absorption of clinical or subclinical amounts of lead were based on the appearance of punctate stippling of the erythrocytes as shown by Wright's stain. It has recently been pointed out by Jones (*7*), McCord, Holden, Johnson (*8*), and others that basophilic substances appearing in erythrocytes (due to presence of toxic agents in the bone marrow or to abnormal physiologic demands) may appear in the form of polychromatophilia, punctate basophilia, or reticular designs, and of these the punctate stippling is least frequently seen (*8*). Thus for our work a modified Manson's methylene blue stain was used, since McCord, Holden, and Johnson (*8*), in studying a series of about 8,000 blood slides, found that this stain yielded most consistent results in the detection of the effects of lead as revealed by the blood picture. Manson's stain as used by these workers shows any or all three of the forms of basophilic materials present in erythrocytes.

For our studies 37 persons who regularly ate uncooked sprayed apples were used as test subjects. In addition, a series of 23 guinea pigs fed apples from the same sources, in the place of other "green" or "fresh" food, were studied. Of the 37 persons followed, 23 were university women students who used imported apples, some eating regularly two a day. The remaining 14 persons used Iowa-grown sprayed apples. The test subjects ate the apples regularly from fall to late winter and early spring, when the blood studies were made. These examinations were purposely made late in the season, with the belief that cumulative lead effects, if present at all, would be most evident after the fruit had been used for several months.

RESULTS AND DISCUSSION

The diphenylthiocarbazone test for the determination of lead in spray residues proved satisfactory for this work. It tested lead amounts varying from 0.000 to 0.027 grain per pound, with easily distinguishable color differences grading from the green at the low end of the scale to the cherry red present with the high lead values. Samples from the same source yielded consistent results.

With the exception of a few instances, lead amounts were found to lie within the 1935 Federal tolerance of 0.018 grain per pound. All imported apples examined gave values definitely below this allowed maximum. Five lots of domestic apples, however, showed excess lead loads ranging from 0.024 to 0.027 grain. These apples were from three orchards, two of them in Iowa and one in Illinois. The Illinois fruit had received "very heavy sprays", but no reason could be ascertained for the excess loads on the lots from the two Iowa

orchards, since spray dates, amount of spray, amount of rainfall, and time of picking did not essentially differ for these orchards. Two samples of unsprayed apples from an orchard adjoining a much-traveled highway were also examined for lead content. It was thought that the exposure of the fruit to exhausts from automobiles using tetraethyl gasoline might result in detectable lead accumulations on the surfaces of the apples, but no evidences of lead were found.

TABLE 1.—*Lead content on skin surface of apples*

I. DOMESTIC APPLES, SPRAYED

Source	Spray dates	Variety of apple	Sample no.	Lead, grains per pound	Average
A	May 5, May 20, June 2	Greening	1	0.009	0.0049
			2	.005	
			3	.008	
		Roman stem	4	.007	
			5	.010	
			6	.004	
		Baldwins	7	.003	
			8	.003	
			9	.008	
			10	.002	
			11	.004	
			12	.0085	
			13	.002	
B	May 3, May 15, June 3	Jonathan	1	.002	.0078
			2	.0045	
			3	.001	
		Grimes Golden	4	.015	
			5	.015	
		MacIntosh	6	.0085	
			7	.009	
C	May 15, May 25, June 3	King David	1	.007	.0065
			2	.007	
			3	.008	
			4	.007	
			5	.005	
			6	.005	
D	3 sprays, dates not registered.	Delicious	1	.0175	.0187
			2	.020	
E	May 7, May 21, June 5	Mixed cider apples [1]	1	.0005	.0165
		Roman Stem	2	.026	
		Iowa Blush	3	.024	
F	Received "heavy spraying".	Jonathans [1]	1	.027	.027
			2	.027	

II. IMPORTED APPLES, WASHED, SPRAYED

G	Sprayed and washed by producer.	Delicious	1	0.0065	0.0065
			2	.004	
			3	.009	
H	Sprayed and washed by producer.	Delicious	1	.005	.0062
			2	.0075	

III. DOMESTIC APPLES, UNSPRAYED

I	Unsprayed	Greening	1	0.000	0.000
			2	.000	

[1] These apples had been washed in preparation for the cider making.
[2] Grown in Illinois for home consumption.

Surface lead loads on Iowa sprayed apples averaged 0.0082 grain per pound. Tests on flesh and cores of domestic sprayed apples ranged from 0.005 to 0.006 grain of lead per pound. These are slightly higher values than those of 0.001 found for apples from the orchard which had never received spray. Since the latter orchard is located in a distinctly rural area, the value may be taken to represent lead amounts

due to natural lead content of the soil. This finding is slightly higher than that of Kehoe, Thamman, and Cholak (*6*), who reported a per pound equivalent of 0.0006 grain in drinking water and 0.0008 grain in green apples in a primitive region practically free from other than natural sources of lead. Examinations of drinking-water samples from 10 different sources (*10*) within the area in which the Iowa apples were obtained were as follows: One sample yielded 0.008 parts of lead per million, one sample 0.005, and eight were recorded as 0.000 (*11*). These findings of differences between the lead content of 0.001 in fruit from an unsprayed orchard and values of 0.005 to 0.006 (surface loads are excluded here) from sprayed orchards may be interpreted as representing an increased lead content due to cumulative amounts of spray lead in the soil. This difference might be expected to become greater in accordance with the number of years the orchard receives spray.

TABLE 2.—*Lead content of entire apple*

Source as listed in table 1	Variety of apple	Sample no.	Lead content in grains per pound: Removed by preliminary HCl wash	Removed by soap rinse	Present in flesh	Present in cores	Total amount	Average
DOMESTIC SPRAYED								
A	Roman Stem	12	0.0085	0.002	0.001	0.0005	0.012	
C	King David	1		.0065	.0025	.0015	.0105	0.011
		6	.005		.006	.0005	.0115	
		8	.0100	.006	.001	.0005	.0175	
D	Delicious	1		.0175	.001	.0005	.019	.0200
		2		.020	.003	.0005	.0235	
E	Mixed cider apples	[1] 1		.0005	.0005	.0005	.0015	
		2		.024	.002	.0005	.0265	.0152
		5	.0120	.005	.0005	.0000	.0175	
F	Johnathan	14		.027	trace	trace	.027	.027
		15		.027	trace	trace	.027	
IMPORTED SPRAYED WASHED								
G	Delicious	1		.0065	.001	.0005	.008	0.0107
		2	.004	.009	.002	.0005	.0135	
H	Delicious	5	.006	.0075	.002	.000	.0095	.0112
				.006	.001	.000	.003	
DOMESTIC, UNSPRAYED. ENTIRE APPLE USED								
I	Greening	3		.000			.001	0.001
		4		.000			.001	
		5					.001	

[1] This lot of apples had been washed in preparation for cider making.

The 1935 Iowa "growing season" varied little from the average season, with about the usual amount of rainfall (see table 3) and with average temperatures (*9*), as opposed to the years of 1934 and 1936. Therefore it would appear that the surface lead loads found on the domestic apples are representative of the amounts to be expected over a period of years if present spraying schedules are maintained.

TABLE 3.—*Precipitation for growing season 1935 (9)*

Month	Rainfall in inches	Normal
April	1.67	3.06
May	5.78	4.19
June	7.91	4.66
July	4.97	4.16
August	3.80	4.06
September	3.72	3.96
October	1.20	2.78
November	4.06	2.11

As seen from table 2 much of the spray residue may be removed from the surface of the apples by a 1 percent hydrochloric-acid rinse. The rinse procedure followed is that outlined by the United States Department of Agriculture (*12*) and generally in use for preparation of sprayed apples entering into interstate commerce. However, as far as we are able to ascertain, Iowa apple growers who sell their products locally do not attempt to remove residues from the fruit nor is it the general practice among Iowa consumers to do so. Furthermore, Giebs (*13*) showed that home methods, such as rinsing the fruit in cold water or wiping with a cloth, are only partially effective in removing spray residues. In a study of 20 lots of apples, she found that rinsing the fruit in cold water reduced the lead load only from an average of 0.0123 grain to 0.0118 grain per pound, and that hand wiping with a cotton towel similarly reduced the lead content only to 0.0094 grain. It is to be noted that, while neither of these two simple procedures may be relied upon for adequate removal of heavy spray residues, the acid rinse can be carried out effectively. Moreover, the procedure is a simple one.

Of the 37 persons and 23 guinea pigs whose blood was studied for the presence of basophilic materials in the red corpuscles as an evidence of toxicity from lead, all gave negative findings. According to McCord, Holden, and Johnson (*8*), human beings normally do not show more than 1 percent of basophilic erythrocytes in the circulating blood. These authors further state that persons absorbing lead may have the percentage of these cells increased to 1.5 or 4.0 or higher before clinical symptoms of plumbism appear. None of our test subjects showed percentages of basophilic erythrocytes exceeding the 1 percent accepted as normal, even though they had regularly consumed the unwashed sprayed apples all winter. It was thought that the family of five regularly using the apples from source E would show red corpuscle changes, but none were present. Similarly, no test subject offered positive signs or symptoms of plumbism.

Although these studies suggest a lack of toxicity from ingestion of lead-spray residues, the question as to the possible injurious effects of long-continued daily consumption of fruits carrying lead residues still arises.

SUMMARY

1. A case of arsenic dermatitis is reported in an individual who ate apples covered with heavy spray residues.

2. Examinations for lead in spray residues on Iowa apples of the 1935 crop showed a lead content generally lower than the maximum allowed by Federal regulations for apples entering into interstate commerce, although two lots from Iowa orchards showed a higher lead content.

3. Imported apples which were examined also showed a lead content much lower than the maximum amount permitted by interstate commerce regulations, with the exception of one lot from an Illinois orchard.

4. Tests on apples from orchards receiving light sprays, as are customary in Iowa, show lower lead determinations than do crops from districts receiving heavier sprays.

5. The lack of increase of basophilic substances in the red blood corpuscles of individuals who ate sprayed apples regularly indicates that the amounts of lead ingested were not sufficient to produce signs of toxicity.

RECOMMENDATIONS

1. Although signs of toxicity were not found by blood tests in persons who ate sprayed apples regularly, some lots of apples exceeded the Federal lead tolerance, and one case of arsenic poisoning is presented; therefore, it is believed that growers who spray their fruit should make use of the 1 percent hydrochloric acid rinse, which is a simple procedure and would at least mitigate a potential danger.

2. Apple-growing States should enact laws giving the State department of health regulatory power to protect consumers against spray residues.

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(11) The "dithizone" (diphenylthiocarbazone) method as given in Standard Methods of Water Analysis, 8th edition, p. 242, 1936, was used in these determinations.

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SIX YEARS' INTENSIVE OBSERVATION ON THE SEASONAL PREVALENCE OF A TICK POPULATION IN WESTERN MONTANA

A Preliminary Summary [1]

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This paper summarizes the results of quantitative studies of an adult tick population, *Dermacentor andersoni*, on a 40-acre tract in the Bitterroot Valley, Mont., over a period of 6 years, 1930 to 1935, inclusive. As observations of biotic activities under natural conditions are included, it is necessary to preface the report with a few general remarks on tick activities and methods of study.

PERTINENT FACTS CONCERNING D. ANDERSONI IN GENERAL

The habits of this tick have been referred to in numerous publications, the latest notable contribution being that of Cooley (1932). It may be stated that 2 years is usually required for completion of the life cycle from oviposition to the mature adult. The immature larval and nymphal stages infest rodents and small animals chiefly, while the adults feed mostly on large animals and man. Molting between these stages occurs off the host; and this tick is thus known as a 3-host tick even though the same animal species, such as the Columbian ground squirrel, serves both the larval and nymphal stage of an individual tick. Little is known concerning the habits of the unfed, or "flat", larvae and nymphs preceding infestation of hosts in nature. The activity of unfed adults, on the other hand, has been abundantly observed and subsequent remarks will refer chiefly to this stage. The season of prevalence, or "tick season", lasts from the first open weather and disappearance of snow until late June or early July, during which time the active adults are to be found on the tips of the low vegetation, usually not more than about 2 feet off the ground. They have been observed in outside "hibernation cages",

[1] From the Rocky Mountain Laboratory, U. S. Public Health Service, Hamilton, Mont. Read before the St. Louis meeting of the American Society of Parasitologists, Jan. 2, 1936.

i. e., under confined but exposed conditions, to survive into the third season without feeding, and there is little reason why this could not occur in nature. As shown later, the longest survival of unrestricted marked ticks in the open has been two full "seasons"; but, as most of the engorged nymphs molt the season before they are ready to feed as adults, this would mean observed survival into the third year in the unfed adult condition.

METHODS

Collections were made by the method of tick "dragging", the drag consisting of a piece of white outing flannel approximately a yard square tied to the end of a light, 5-foot pole, like a flag. This was dragged over low vegetation in such a manner that an estimated 5-foot, "zig-zag" swath was covered in the line of travel. The active, adult tick population was thus sampled on a surveyed 40-acre tract of representative tick-infested country along five straight, equidistant lines or crossings. No deviations were allowed for such topographic features as game trails, fallen timber, or thickets, so that the sample could be considered average for the whole area. On the basis of proportionate space sampled (approximately 16,500 square feet) it was estimated that very close to 1 percent of active ticks on the area were represented in each day's catch.

Records for each collection included time of day, elapsed time of actual collecting operations by stop watch to standardize rate of travel (experience established as optimum, 20 minutes per crossing not including time for release of ticks from flag), soil surface and 4-foot air temperatures, wind velocity by Tycos anemometer, observed weather conditions, and host incidence by numbers of animals and game birds seen or by fresh sign. As details of these observations and data will be presented later, only incidental reference is included in this summary.

Sampling was repeated over exactly the same line of travel marked by blazes or landmarks so that the seasonal trends would be on a comparable basis. Initial draggings varied in different seasons with weather conditions and accessibility, which accounts for the fact that some ticks were already out of hibernation by the time of the first visit. These initial dates were April 17, 1930, April 15, 1931, March 31, 1932, April 4, 1933, February 14, 1934, and April 18, 1935. In order to maintain the tick population as nearly undisturbed as possible, ticks were released as soon as caught. The rate of progress was standardized by use of a stop watch and a mechanical counter facilitated keeping track of tick totals. The value of this procedure is at once realized when it is mentioned that an average of as many as seven ticks per minute were recovered on one crossing in 1930.

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Many of the same ticks were repeatedly taken as the season progressed, determined by "tipping" the body of early captured ticks with a spot of enamel paint. The use of a different color each year made it possible also to check the number of seasons of reappearance of such specimens as subsequently reappeared on the crossings. Care was exercised to see that such spots were not extensive enough to interfere with the natural activities of the ticks.

OBSERVATIONS

Snow was still on a considerable portion of the upper and lower crossings on the initial dates of sampling in 1932, 1933, and 1934.

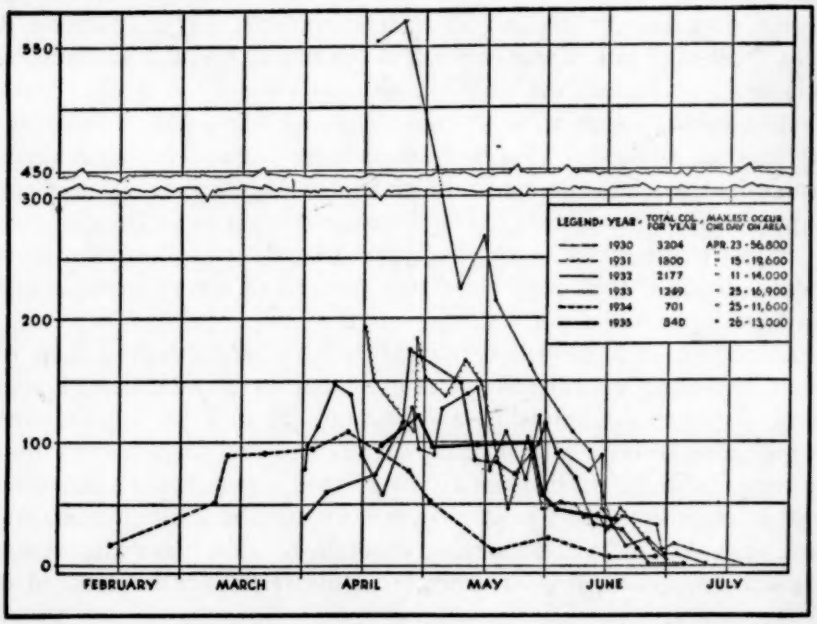

FIGURE 1.—Seasonal incidence of the Rocky Mountain wood tick in the Como area of western Montana, 1930–1935, inclusive.

Many ticks appeared on dead grass stems and weed stems in isolated patches from which the snow was just disappearing. In order to obtain a complete perspective of occurrence it would therefore be necessary to start operations as soon as the snow began to disappear on any part of the area, but the present data are sufficiently comprehensive for practical purposes. Incidence for the several years is plotted in figure 1. In some respects the curve for 1933 presents the most satisfactorily complete trend of the 6 years considered. This was undoubtedly because the appearance of ticks from hibernation was retarded by a cold and "backward" spring that year. On the other hand, less sudden, presumably dispersing, influence of an early, open spring is seen in the low curve for 1934.

The maximum number of ticks taken in any one day was 568, on April 23, 1930. Based on the estimate of 1 percent catch of total ticks on the area, the calculated population at that time would have been 56,800 ticks on the 40-acre tract, or some 1,420 ticks to the acre. Calculated on the same basis, the comparative maximum population over the whole 40-acres in 1931 would have been 19,600 on April 15; in 1932, 14,000 on April 11; in 1933, 16,900 on April 25; in 1934, 11,700 on April 11; and in 1935, 13,000 on April 26. The total actual catches on the five crossings for each of the 6 years were as follows: 1930, 3,063; 1931, 1,770; 1932, 2,168; 1933, 1,249; 1934, 701; and 1935, 840. The least maximum, single day's sample as well as the smallest seasonal total, occurred in 1934. Over three and one-half times as many ticks were taken through the first season (1930) as through the last (1935), whereas the greatest (1930) and least (1934) single maximum collections showed a difference of nearly five times the number of ticks concerned.

It was at first thought that this progressive and marked drop in tick population might be due to a decrease in animal hosts. The area was unfortunately included in the county rodent-control operations the first 2 years by mistake. However, the animal counts do not show sufficient differences to account for so marked a decrease. The presence of wild game (deer, elk, and occasional moose) or range cattle was almost continuous within the area, indicated by fresh sign or by actual discovery, and other local experience indicated an abundance of adult tick hosts each year. Ground squirrels (*Citellus columbianus*) and chipmunks (*Eutamias amoenus*) constitute the chief hosts of the immature stages on the area with presence, probably negligible, of occasional pine (*Sciurus hudsonicus*) and sidestripe (*Callospermophilus lateralis*) squirrels. The importance of mice on the area is unknown. The rodent counts are relative at best, but sufficiently comparable to indicate population trends. The averages per day through the season for the 6 years were respectively: Ground squirrels—0.3, 1, 1.5, 2, and 1.5; chipmunks—2, 6, 3.3, 3, 1.5, and 1.7. From this it is not clear how the yearly incidence of either the large or small animal hosts was sufficiently variable to have affected the local tick population adversely, although the status of the rodent population preceding 1930 was not determined and might have been important.

It is remarkable that, in spite of considerable variation in field conditions and weather of the several springs, the maximum for each year occurred within the 2 weeks of April 11 to 25, progressively decreasing thereafter, with a marked drop during the second week in June and practical disappearance by early July. No comparable quantitative figures are available for *Dermacentor variabilis*, the common wood tick of the East, but empirical observations are available

showing much later seasonal prevalence, with maxima probably in June, which may be an important factor in the later seasonal incidence of Rocky Mountain spotted fever in the East compared with that in the West.

Experience indicates the violent irregularities in the curves (fig. 1) to be due chiefly to inclement dragging conditions, rather than variations in tick incidence on the vegetation. Strong or gusty wind, particularly, hampered operations by lifting the flag off the vegetation, and velocities of 400 to 600 feet per minute and over resulted in delayed or postponed sampling. While their reactions to passing "baits" are retarded during exposure to lowered temperatures or precipitation, ticks may nevertheless be seen still clinging to their perches on the vegetation. A considerable proportion appears to remain in position ready for opportunity of infestation during the night also, as indicated by a midnight collection in 1935. These midnight data compared with the adjoining diurnal observations were as follows:

Date, 1935	Time of start	Temperature		Wind velocity, feet per minute	Total ticks	Sex		Elapsed time, minutes	Painted ticks	
		Soil surface	Air			Male	Female		1934	1935
		° F.	° F.							
May 14	1 p. m.	60	70	180	94	47	47	101	------	6
May 16	Midnight	52	72	62	63	33	30	137	1	3
May 21	1 p. m.	82	80	168	103	54	49	101.5	------	6

"Painted" ticks, marked early in each season, were never taken in any great proportion during subsequent collections, but the scattering records are of interest. The last records for such ticks for each of the 6 years, were, respectively, July 8, June 4, June 10, June 22, June 5, and June 17, thus showing activity throughout the adult tick season on the part of some individuals. On the other hand, as many as 11 ticks marked at the beginning of 1930, were taken on April 17 a year later, with a noticeable decline of such ticks by May 5 but without a concomitant decrease of those marked earlier the same season (1931). This would possibly indicate early aestivation or death of some older individuals not finding hosts. While some depletion may be explained by host infestation and perhaps also by moderate migration off the crossings, consideration of persistence of certain marked younger specimens, repeatedly taken in the same isolated locations not readily accessible to larger animals was responsible for the opinion of early aestivation of older ticks. Certain marked individuals persisted in the same spot throughout several collections and became well known to the operator. In one interesting instance a tick marked early in April 1931 reappeared on the drag of April 6,

1932, and was then "double marked", a treatment accorded all similar ticks taken a second season. This tick was not recovered again for over a month and then it reappeared in the same spot on May 11. The location, sex, and type of "brand" marked this tick in the mind of the observer in the latter year.

Some adults in June appear to be freshly molted as though from nymphs engorged early in the same spring. It is not usual for such adults to be interested in feeding in both stages the same season. On four occasions partially fed females were also captured on the drag. These must have been dislodged from passing animals and were again seeking a host. It is known that such individuals, if infected, could effect rapid transfer of spotted fever if they should become attached to a human host. Flat nymphs were occasionally taken, but never larvae.

These records also have shown the sex ratios to vary with the lateness of the season. The early collections usually have a preponderance of males, but the proportions become reversed by June. Isolated records for 1932 may be cited: March 31—58 males, 24 females; April 24—52 males, 65 females; June 2—all 10 females; July 5—all 5 females. This observation is confirmed by counts of large numbers of ticks sampled at random in other localities, although usually some males are also taken late in the season.

Moderate concentration observed where crossings and game trails coincided confirmed previous random observations of such activity by several workers. Occasional draggings between crossings yielded no marked ticks, indicating not much disposition on the part of "disappointed" ticks to migrate for more than short distances. One would suspect that maximum stimulus to move would occur during this study by repeated disturbance of ticks along the crossings, as no care was exercised in releasing the ticks from the drag.

SUMMARY

Quantitative samples of an adult tick population (*Dermacentor andersoni*) on the vegetation of a surveyed 40-acre tract in the Bitterroot Valley, Mont., were made by the "dragging method", approximately biweekly or weekly, according to conditions, through the "tick-season" of 1930 and the five subsequent seasons. Repeated samples were taken over exactly the same straight lines of travel without regard to contour, game trails, changes in vegetational cover, or moderate inclemencies of weather; each sample yielded an estimate of one percent of active ticks on the area for the day, based on percentage of area covered. Recovered ticks were liberated as soon as taken. Ticks caught early in the season were touched dorsally with a drop of paint, a different color for each season, and by this means were found

to persist through at least two seasons in the unfed condition, although tremendously depleted in numbers through various natural causes by the second season. Males predominated in the early samples. Peaks of abundance occurred about the middle of April, while the beginning of hot weather in June resulted in rapid depletion of numbers so that by early July few or no ticks were taken on the crossings. Neither precipitation nor nightfall caused them to leave the vegetation, but moderate concentration on game trails was observed.

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DEATHS DURING WEEK ENDED DECEMBER 12, 1936

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Dec. 12, 1936	Corresponding week, 1935
Data from 86 large cities of the United States:		
Total deaths	8,790	8,713
Deaths per 1,000 population, annual basis	12.3	12.1
Deaths under 1 year of age	521	563
Deaths under 1 year of age per 1,000 estimated live births	47	52
Deaths per 1,000 population, annual basis, 50 weeks of year	12	11.4
Data from industrial insurance companies:		
Policies in force	68,870,782	67,807,743
Number of death claims	12,992	13,579
Death claims per 1,000 policies in force, annual rate	9.9	10.4
Death claims per 1,000 policies, 50 weeks of year, annual rate	9.7	9.5

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended December 19, 1936, and December 21, 1935

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Dec. 19, 1936, and Dec. 21, 1935

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935
New England States:								
Maine	4	2	7	1	53	255	1	0
New Hampshire	-	-	-	-	9	24	0	0
Vermont	-	-	-	-	1	79	0	0
Massachusetts	5	10	-	-	456	195	2	4
Rhode Island	-	-	-	-	158	122	0	1
Connecticut	2	7	3	7	116	76	0	2
Middle Atlantic States:								
New York	32	45	[1]23	[1]13	215	579	8	12
New Jersey	16	14	20	10	158	20	1	1
Pennsylvania	55	55	-	-	43	127	7	3
East North Central States:								
Ohio	45	37	5	9	22	52	8	3
Indiana	19	56	45	25	12	-	2	1
Illinois	37	73	113	34	27	20	9	4
Michigan	20	19	-	6	21	27	7	4
Wisconsin	1	3	86	55	34	75	0	2
West North Central States:								
Minnesota	15	3	-	-	25	54	1	1
Iowa	5	34	5	-	2	5	2	0
Missouri	10	46	85	96	7	15	1	2
North Dakota	1	2	3	2	-	14	0	0
South Dakota	-	9	-	1	1	2	0	0
Nebraska	8	9	-	-	3	17	0	2
Kansas	6	13	4	4	10	7	2	3
South Atlantic States:								
Delaware	12	2	-	-	53	102	0	0
Maryland [2]	10	20	14	35	128	41	7	5
District of Columbia	10	16	-	1	6	1	3	1
Virginia	36	26	-	-	46	22	7	4
West Virginia	19	33	109	43	43	3	1	3
North Carolina [2]	70	36	12	21	22	7	4	1
South Carolina	8	2	353	230	20	-	2	0
Georgia [2]	19	9	209	88	-	-	2	3
Florida [2]	12	11	9	4	3	1	3	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Dec. 19, 1936, and Dec. 21, 1935—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935
East South Central States:								
Kentucky	15	23	31	37	60	32	7	2
Tennessee	28	39	59	40	8	2	3	5
Alabama [3]	23	14	117	156	2	6	1	2
Mississippi [3]	10	3					0	1
West South Central States:								
Arkansas	4	8	23	52		3	0	0
Louisiana	13	21	12	21	1	22	0	1
Oklahoma [4]	5	22	56	80	9		3	8
Texas [3]	74	97	561	185	72	14	2	6
Mountain States:								
Montana	1	7	65	22		20	2	0
Idaho			4	2	86	11	0	0
Wyoming	1					2	1	0
Colorado	4	11	1		1	7	0	0
New Mexico	4	11	1	3	44	2	0	0
Arizona	4	5	93	47	72		0	0
Utah [3]					70		3	1
Pacific States:								
Washington	8	2			20	157	2	3
Oregon	1	9	39	23	9	323	1	1
California [3] [5]	49	33	58	40	28	302	9	6
Total	721	897	2,225	1,393	2,176	2,845	114	98
51 weeks of year	28,211	37,290	155,735	116,947	283,247	719,482	7,317	5,470

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935
New England States:								
Maine	0	2	24	17	0	0	1	3
New Hampshire	0	0	3	7	0	0	0	1
Vermont	0	1	2	11	0	0	0	1
Massachusetts	0	6	178	250	0	0	1	0
Rhode Island	0	0	38	31	0	0	0	0
Connecticut	0	0	57	40	0	0	3	1
Middle Atlantic States:								
New York	2	8	496	590	47	0	8	4
New Jersey	0	1	103	138	0	0	0	1
Pennsylvania	0	2	417	393	0	0	4	5
East North Central States:								
Ohio	5	1	274	288	2	1	4	4
Indiana	0	0	172	263	1	6	2	3
Illinois	1	3	423	593	0	2	5	6
Michigan	1	1	370	296	1	0	8	4
Wisconsin	1	0	257	445	6	8	1	1
West North Central States:								
Minnesota	1	1	140	301	11	5	2	1
Iowa	0	4	99	184	15	19	1	1
Missouri	0	0	101	192	3	4	10	3
North Dakota	0	0	25	67	13	3	0	0
South Dakota	1	0	76	53	10	6	0	3
Nebraska	0	0	43	249	1	20	1	0
Kansas	5	2	250	125	7	12	2	1
South Atlantic States:								
Delaware	0	0	22	19	0	0	0	1
Maryland [3]	0	1	69	101	0	0	8	15
District of Columbia	0	0	16	10	0	0	3	0
Virginia	1	1	39	50	0	0	6	4
West Virginia	0	0	77	75	0	0	6	2
North Carolina [3]	0	3	65	53	2	0	1	4

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Dec. 19, 1936, and Dec. 21, 1935—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935	Week ended Dec. 19, 1936	Week ended Dec. 21, 1935
South Atlantic States—Continued.								
South Carolina	0	1	6	5	0	0	2	1
Georgia [2]	4	0	31	20	0	0	6	3
Florida [2]	1	0	10	6	0	0	0	0
East South Central States:								
Kentucky	1	0	63	46	0	0	3	3
Tennessee	1	1	45	41	0	0	3	2
Alabama [2]	3	0	20	17	0	1	5	1
Mississippi [2]	0	0	13	21	0	0	3	0
West South Central States:								
Arkansas	3	0	17	13	0	0	0	2
Louisiana	1	1	16	12	0	0	8	9
Oklahoma [4]	4	0	11	36	0	0	2	8
Texas [3]	0	0	117	75	4	0	9	16
Mountain States:								
Montana	0	0	61	90	28	34	0	2
Idaho	0	0	48	45	0	0	3	0
Wyoming	0	0	12	80	1	3	0	0
Colorado	0	0	21	170	7	5	1	2
New Mexico	0	1	22	64	0	0	2	10
Arizona	0	0	15	30	0	0	1	0
Utah [2]	0	0	23	72	0	0	0	0
Pacific States:								
Washington	1	0	47	73	1	25	2	2
Oregon	2	2	43	47	29	1	2	3
California [3] [5]	6	9	306	280	2	8	6	8
Total	45	52	4,783	6,084	191	163	135	141
51 weeks of year	4,472	10,692	230,223	246,192	7,307	7,297	14,488	17,342

[1] New York City only.
[2] Week ended earlier than Saturday.
[3] Typhus fever, week ended Dec. 19, 1936, 32 cases, as follows: North Carolina, 2; Georgia, 13; Florida, 1; Alabama, 9; Texas, 6; California, 1.
[4] Exclusive of Oklahoma City and Tulsa.
[5] Rocky Mountain spotted fever, week ended Dec. 19, 1936, California, 1 case.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
November 1936										
Idaho	7	7	16	-------	151	-------	1	125	4	17
Iowa	5	19	9	-------	11	-------	12	306	19	16
Louisiana	4	81	87	114	14	11	7	60	1	43
Maryland	25	74	31	-------	175	-------	4	271	0	27
Michigan	9	129	6	3	117	-------	12	1,122	3	29
Nebraska	2	11	-------	-------	8	-------	4	114	4	0
Nevada	-------	-------	29	-------	2	-------	0	48	0	3
New York	42	98	-------	7	483	-------	19	1,311	0	43
Ohio	17	178	68	2	54	-------	33	1,235	2	52
Pennsylvania	20	155	-------	3	162	3	23	1,329	0	104
Rhode Island	2	5	-------	-------	384	-------	1	84	0	3
Vermont	-------	1	-------	-------	4	-------	1	32	0	2
Wisconsin	3	21	95	-------	124	-------	1	852	26	-------
Wyoming	1	2	-------	2	8	-------	1	64	6	-------

November 1936

	Cases
Anthrax:	
New York	1
Pennsylvania	2
Chickenpox:	
Idaho	89
Iowa	386
Louisiana	7
Maryland	214
Michigan	1,835
Nebraska	98
Nevada	87
New York	1,788
Ohio	1,662
Pennsylvania	2,669
Rhode Island	99
Vermont	172
Wisconsin	1,637
Wyoming	103
Conjunctivitis:	
Idaho	12
Diarrhea:	
Maryland	25
Ohio (enteritis included)	20
Dysentery:	
Iowa (bacillary)	2
Louisiana (amoebic)	15
Louisiana (bacillary)	3
Maryland	36
Michigan (amoebic)	3
Michigan (amoebic carriers)	1
Michigan (bacillary)	3
New York (amoebic)	2
New York (bacillary)	62
Ohio (bacillary)	4
Pennsylvania (bacillary)	2
Rhode Island (bacillary)	1
Encephalitis, epidemic or lethargic:	
Idaho	2
Iowa	3
Maryland	1
Michigan	1
New York	5
Ohio	1
Pennsylvania	2
Wisconsin	2
Wyoming	1
German measles:	
Idaho	2
Iowa	1
Maryland	9
Michigan	36
New York	76
Ohio	11
Pennsylvania	59
Wisconsin	46
Wyoming	5
Hookworm disease:	
Louisiana	8
Impetigo contagiosa:	
Idaho	13
Maryland	42
Michigan	3
Lead poisoning:	
Ohio	12
Leprosy:	
Michigan	1
Mumps:	
Idaho	32
Iowa	66
Louisiana	5
Maryland	260
Michigan	478
Nebraska	55
Nevada	5
Ohio	69
Pennsylvania	932
Rhode Island	24
Vermont	87
Wisconsin	499
Wyoming	46
Ophthalmia neonatorum:	
Maryland	1
New York [1]	6
Ohio	51
Pennsylvania	6
Wisconsin	3
Paratyphoid fever:	
Michigan	2
New York	12
Ohio	2
Puerperal septicemia:	
Ohio	5
Rabies in animals:	
Louisiana	15
Michigan	8
New York [1]	2
Scabies:	
Idaho	8
Maryland	1
Septic sore throat:	
Idaho	141
Iowa	2
Louisiana	3
Maryland	13
Michigan	33
New York	29
Ohio	67
Rhode Island	4
Wisconsin	1
Wyoming	3
Tetanus:	
Louisiana	3
New York	5
Ohio	2
Pennsylvania	2
Trachoma:	
Idaho	12
Iowa	1
Pennsylvania	1
Rhode Island	1
Trichinosis:	
New York	13
Pennsylvania	1
Tularaemia:	
Iowa	9
Michigan	1
Ohio	7
Pennsylvania	2
Wisconsin	5
Typhus fever:	
Louisiana	1
New York	1
Undulant fever:	
Iowa	9
Louisiana	5
Maryland	1
Michigan	6
New York	25
Ohio	8
Pennsylvania	10
Rhode Island	5
Vermont	1
Wisconsin	4
Vincent's infection:	
Idaho	4
Maryland	6
Michigan	21
New York [1]	59
Whooping cough:	
Idaho	18
Iowa	136
Louisiana	24
Maryland	459
Michigan	928
Nebraska	27
Nevada	17
New York	1,088
Ohio	975
Pennsylvania	2,052
Rhode Island	67
Vermont	125
Wisconsin	568
Wyoming	6

[1] Exclusive of New York City.

WEEKLY REPORTS FROM CITIES

City reports for week ended Dec. 12, 1936

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table. Weekly reports are received from about 700 cities, from which the data are tabulated and filed for reference.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	1		0	0	5	2	0	0	0	2	28
New Hampshire:											
Concord	0		0	0	0	1	0	0	0	0	12
Manchester	0		0	0	2	1	0	0	0	0	15
Nashua	0			0		0	0		0	0	
Vermont:											
Barre	0		0	1	1	0	0	2	0	1	4
Rutland	0		0	0	2	0	0	0	2	2	6
Massachusetts:											
Boston	0		1	4	10	43	0	12	0	224	221
Fall River	0		0	0	2	4	0	2	0	1	32
Springfield	0		0	0	2	3	0	1	0	8	35
Worcester	0		0	14	14	1	0	0	0	25	56
Rhode Island:											
Pawtucket											
Providence	0		0	15	4	24	0	1	0	18	66
Connecticut:											
Bridgeport	0	1	0	29	3	1	0	2	0	6	40
Hartford	0		0	0	2	11	0	1	0	10	
New Haven	0		0	0	2	2	0	2	0	2	29
New York:											
Buffalo	0		0	35	0	10	0	6	0	23	116
New York	34	14	7	56	126	124	0	88	6	72	1,533
Rochester	0		0	1	9	3	0	0	0	4	64
Syracuse	0		0	10	2	11	0	0	0	10	57
New Jersey:											
Camden	1		1	0	2	1	0	2	0	1	25
Newark	0		0	33	16	9	0	8	0	20	103
Trenton	1	1	0	0	0	6	0	2	0	0	20
Pennsylvania:											
Philadelphia	6	4	3	5	36	86	0	24	1	113	490
Pittsburgh	3	4	5	3	26	55	0	6	1	37	179
Reading	0		3	2	1	2	0	2	0	25	35
Scranton	0			1		6	0		0	0	
Ohio:											
Cincinnati	3		1	1	19	7	0	9	0	7	144
Cleveland	5	17	1	2	21	42	0	12	0	35	213
Columbus	3	1	1	0	4	5	0	4	0	7	82
Toledo	1		0	1	2	3	0	8	0	15	78
Indiana:											
Anderson	0		0	0	0	4	0	0	0	1	9
Fort Wayne	2		0	0	1	6	0	2	0	0	27
Indianapolis	4		0	5	12	16	0	2	0	13	96
South Bend	0		0	0	2	2	0	0	0	4	13
Terre Haute	0		0	0	0	9	0	0	0	0	22
Illinois:											
Alton	1		0	0	1	4	0	0	0	0	6
Chicago	10	36	3	6	60	205	0	23	0	71	708
Elgin	3		0	0	0	0	0	0	0	17	4
Moline	0		0	0	1	0	0	1	0	2	8
Springfield	1		0	0	5	6	0	0	0	7	24
Michigan:											
Detroit	6		0	8	27	149	0	15	1	113	267
Flint	4		0	1	5	11	0	0	0	10	22
Grand Rapids	0		1	2	1	7	0	0	4	3	30
Wisconsin:											
Kenosha	0		0	0	1	2	0	0	0	4	10
Madison	0		0	1	0	5	0	1	0	7	20
Milwaukee	1		0	5	6	33	0	4	0	33	100
Racine	0		0	0	0	17	0	1	1	0	9
Superior	0		0	1	0	3	0	0	0	5	12
Minnesota:											
Duluth	0		0	0	0	22	0	0	0	0	22
Minneapolis	3		0	0	9	11	0	0	0	3	124
St. Paul	0		0	1	8	13	0	0	0	23	61

City reports for week ended Dec. 12, 1936—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Iowa:											
Cedar Rapids	0	------	-------	0	------	1	0	------	0	3	-------
Davenport	0	------	-------	0	------	1	0	------	0	0	-------
Des Moines	0	------	-------	0	------	15	0	------	0	0	47
Sioux City	0	------	-------	0	------	13	3	------	0	0	-------
Waterloo	2	------	-------	0	------	2	0	------	0	10	-------
Missouri:											
Kansas City	2	------	2	2	7	27	0	3	0	10	94
St. Joseph	-------	------	-------	-------	------	-------	-------	-------	-------	-------	-------
St. Louis	13	------	0	1	11	35	0	10	2	34	224
North Dakota:											
Fargo	0	------	0	0	1	3	0	0	0	0	11
Grand Forks	0	------	-------	0	------	0	0	------	0	0	-------
Minot	0	------	0	0	0	0	0	0	0	0	9
South Dakota:											
Aberdeen	0	------	-------	0	------	1	0	------	0	0	-------
Nebraska:											
Omaha	0	------	0	1	8	5	0	0	0	1	54
Kansas:											
Lawrence	0	2	-------	0	0	1	0	0	0	0	7
Topeka	0	------	1	1	5	4	0	1	0	0	36
Wichita	0	------	0	0	9	5	0	1	0	0	34
Delaware:											
Wilmington	0	------	0	18	2	1	0	0	0	1	29
Maryland:											
Baltimore	3	8	0	96	29	21	0	14	1	124	221
Cumberland	0	1	0	1	3	0	0	0	1	0	20
Frederick	0	------	0	0	0	1	0	1	0	0	4
District of Columbia:											
Washington	5	2	2	1	22	10	0	12	1	31	189
Virginia:											
Lynchburg	0	------	0	1	1	1	0	2	0	0	20
Norfolk	0	3	0	1	2	5	0	1	0	0	21
Richmond	1	------	1	0	11	1	0	3	1	0	79
Roanoke	1	------	0	0	2	2	0	0	0	0	20
West Virginia:											
Charleston	0	------	0	0	1	0	0	0	0	0	23
Huntington	1	------	-------	0	------	3	0	------	0	0	-------
Wheeling	0	------	0	0	10	1	0	0	0	0	29
North Carolina:											
Gastonia	0	------	-------	0	------	0	0	------	0	0	-------
Raleigh	0	------	0	0	4	1	0	0	0	0	29
Wilmington	0	------	0	0	2	0	0	0	0	0	8
Winston-Salem	1	------	0	0	2	2	0	1	0	0	13
South Carolina:											
Charleston	1	26	0	0	7	3	0	3	0	0	27
Columbia	0	------	0	0	8	0	0	0	0	0	24
Florence	1	------	0	0	0	0	0	1	0	0	8
Greenville	1	------	0	0	5	1	0	0	0	0	15
Georgia:											
Atlanta	1	22	6	0	18	11	0	2	0	0	110
Brunswick	-------	------	-------	-------	------	-------	-------	-------	-------	-------	-------
Savannah	0	90	5	0	6	0	0	0	0	2	56
Florida:											
Miami	0	------	0	1	1	0	0	2	0	0	29
Tampa	0	4	4	1	6	0	0	1	0	0	39
Kentucky:											
Ashland	0	------	-------	0	------	0	0	------	0	0	-------
Covington	0	------	0	0	3	1	0	1	0	0	20
Lexington	0	2	0	0	2	0	0	3	0	0	25
Tennessee:											
Knoxville	3	------	1	0	5	0	0	0	0	0	29
Memphis	1	------	0	0	5	8	0	4	0	7	96
Nashville	1	------	1	0	6	4	0	4	0	0	62
Alabama:											
Birmingham	1	10	0	1	12	3	0	5	1	1	85
Mobile	0	------	3	0	0	5	0	0	0	0	25
Montgomery	2	------	-------	0	------	5	0	------	0	1	-------
Arkansas:											
Fort Smith	1	------	-------	0	------	3	0	------	0	0	-------
Little Rock	0	------	0	0	7	0	0	1	0	0	8

City reports for week ended Dec. 12, 1936—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
Lake Charles	0	----	0	0	1	0	0	0	0	0	2
New Orleans	1	5	4	1	32	0	0	10	2	0	160
Shreveport	0	----	0	0	10	1	0	2	0	0	51
Oklahoma:											
Oklahoma City	2	----	1	0	5	4	0	2	1	0	37
Tulsa	0	----	----	1	----	2	0	----	0	0	----
Texas:											
Dallas	6	3	3	1	9	14	0	1	0	2	64
Fort Worth	3	5	0	24	1	5	1	1	0	5	41
Galveston	0	----	0	0	2	0	0	0	0	0	14
Houston	3	----	1	0	9	4	0	4	0	0	86
San Antonio	2	----	1	0	12	0	0	9	0	0	73
Montana:											
Billings	0	----	0	1	1	2	0	0	0	0	11
Great Falls	0	----	0	0	1	0	3	0	0	0	7
Helena	0	----	0	0	2	3	0	0	0	0	7
Missoula	0	----	0	0	1	0	0	0	0	0	4
Idaho: Boise	0	----	0	0	1	3	0	0	0	0	11
Colorado:											
Colorado Springs	0	----	0	0	3	1	0	0	0	0	13
Denver	4	----	0	4	5	20	0	7	0	43	91
Pueblo	1	----	0	0	1	1	0	0	0	0	10
New Mexico: Albuquerque	0	----	0	2	3	7	0	6	0	0	19
Utah: Salt Lake City	0	----	0	2	7	13	0	3	0	5	44
Nevada: Reno	----	----	----	----	----	----	----	----	----	----	----
Washington:											
Seattle	6	----	0	4	12	5	0	5	0	1	108
Spokane	0	----	0	0	7	7	0	0	2	0	37
Tacoma	0	----	1	0	4	1	0	1	0	0	34
Oregon:											
Portland	0	----	2	2	9	6	1	2	0	7	82
Salem	0	----	----	0	----	1	0	----	0	8	----
California:											
Los Angeles	15	22	5	3	29	39	0	26	0	71	397
Sacramento	2	1	1	0	2	14	0	4	0	5	34
San Francisco	5	1	0	2	11	24	0	8	0	26	202

State and city	Meningococcus meningitis		Poliomyelitis cases	State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Delaware:			
Boston	2	1	0	Wilmington	1	0	0
Rhode Island:				Maryland:			
Providence	2	0	0	Baltimore	4	0	1
New York:				District of Columbia:			
New York	9	8	0	Washington	1	1	0
Pennsylvania:				Tennessee:			
Philadelphia	1	0	0	Knoxville	0	0	2
Reading	1	0	0	Memphis	1	0	1
Ohio:				Louisiana:			
Cincinnati	0	1	1	Lake Charles	1	0	0
Cleveland	0	0	1	Oklahoma:			
Columbus	0	0	1	Oklahoma City	2	0	0
Toledo	2	0	0	Oregon:			
Illinois:				Portland	2	0	0
Chicago	0	0	3	California:			
Michigan:				Los Angeles	1	1	3
Detroit	5	3	1				
Missouri:							
St. Louis	0	0	2				

Encephalitis, epidemic or lethargic.—Cases: Columbus, 1.
Pellagra.—Cases: Charleston, S. C., 1; Savannah, 1; Memphis, 1; Dallas, 1.
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[1] Includes 98 cases nonparalytic at time of notification.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

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FURTHER STUDY OF THE DURATION AND COST OF FEDERAL COMPENSATION CASES WITH DISEASE AS A COMPLICATING FACTOR

Cases Classified Into Accidental Injuries, Occupational Diseases, and Hernias [1]

By WILLIAM M. GAFAFER, *Senior Statistician, United States Public Health Service*

INTRODUCTION

Analyses of compensation cases with reference essentially to duration and cost, and, in particular, analyses based on a classification of cases into those of accidental and nonaccidental origin, are of more than ordinary interest at the present time. The situation is thus, primarily, for the reason that the governing bodies of many States are confronted by the controversial question of whether a system of blanket or schedule coverage shall be adopted with respect to the compensation of injuries connected with occupational diseases. The Federal act providing for the compensation of the cases which form the subject matter of this inquiry was established in 1916 and has been continuously administered by the United States Employees' Compensation Commission. The act subscribes to blanket coverage in that the term *injury* as written into the act has been interpreted as including not only accidents as ordinarily defined, but also any bodily injury or disease due to the performance of duties and causing incapacity for work.

A previous paper (*1*), based on data made available by the United States Employees' Compensation Commission, dealt with the duration and cost of 1,337 compensation cases in which disease was a complicating factor. These cases occurring among civil employees of the United States Government were incomplete in the sense that they were still being compensated on December 31, 1935, and involved long-continued or permanent disability (both partial and total). In the present paper it is purposed to study the same collection of cases but with the use of a classification only casually introduced in the previous report, namely, a classification depending upon whether cases are of accidental or nonaccidental origin, the latter including those cases which involve what may be considered occupational diseases.

[1] From the Office of Industrial Hygiene and Sanitation, U. S. Public Health Service.

To familiarize the reader with the material, some of the results previously obtained are briefly summarized as follows: (1) Of the 1,337 incomplete cases with disease as a complicating factor, 71 percent were partially disabled while the remainder were totally disabled. (2) Almost 50 percent of the cases were compensated for injuries that occurred 10 or more years ago. (3) The total duration of the cases amounted to nearly 2.7 million days and was approximately equally divided between the partially and totally disabled groups. (4) The total compensation paid was over 7 million dollars; the average compensation paid per case was $5,343, and the estimated future cost of the cases was over 8 million dollars. (5) Regardless of the degree of disability, arthritis as a complicating factor easily ranked first with respect to the number of cases, total duration, and total compensation paid; general infections and tuberculosis ranked next as complicating factors. Particularly important in connection with the present paper is an additional finding; namely, of the 1,337 incomplete cases with disease as a complicating factor, 84 percent resulted from accidental injuries or were activated or aggravated by them; about 11 percent were of nonaccidental origin or involved what may be designated occupational diseases; and about 5 percent were accounted for by hernias.[2] The analyses to follow will be based on this classification, with emphasis principally on the relation of accidental to nonaccidental injuries with respect to severity of disability, duration, and cost. The relatively small number of hernias are included in the various tables for the sake of the completeness of the picture, and only occasionally will reference be made to them in the text.

With regard to the population exposed or the number of civil employees within the scope of the Compensation Act of 1916, it was estimated by the Commission that the number for a period of approximately 15 years prior to 1933 did not exceed 700,000. Since 1933 the number has increased to between 900,000 and 1,000,000.

Other pertinent information of an introductory and supplementary nature may be found in the recent paper to which reference has been previously made. Throughout the present paper it must be recognized that the data deal with incomplete cases in which disease is a complicating factor; *cases involving accidents only are not included.*

ANALYSIS OF THE DATA

Duration of cases and compensation paid.—The duration of the incomplete cases and the compensation paid, classified according to the kind of injury, are shown in table 1. The table, indicating the nature of the available material, is specific for the degree of severity

[2] "Hernia is, technically and medically speaking, a disease, but since it is usually compensated only as an accidental traumatic injury, it is an open question how it should be classified. It seems best to isolate it entirely in the list." (2)

of disability, and the injuries are classified into accidental injuries, occupational diseases, and hernias. Regardless of the degree of disability, the percentages for the three categories, accidental injuries, occupational diseases, and hernias, with respect to the total number of cases, total duration, and total compensation, are similar within each category. Thus, accidental injuries accounted for 84 percent of all cases, 81 percent of the total duration of all cases, and 80 percent of the total compensation paid for all cases; for occupational diseases the corresponding percentages are 11, 14, and 15, and for hernias, 5, 6, and 5. Infectious diseases accounted for approximately one-half of the occupational diseases, less than one-half of their total duration, and more than one-third of the compensation paid for them. A total of 69 (92 percent) of the 75 cases of infectious disease is associated with tuberculosis. Considering all 1,337 cases, the average compensation paid per case is $5,343. The highest averages are $9,432 and $9,287 paid for cases involving fatigue, strain, posture, *and* lighting, and temperature, moisture, *and* air pressure, respectively. About one-half of the 30 cases constituting the former classification were equally divided between cases associated with tuberculosis and eye affections, while approximately two-thirds of the 30 cases of the temperature, moisture, and air-pressure group were associated with tuberculosis. The average compensation paid per case of occupational disease is $6,964, which is 36 percent greater than the average for accidental injuries and 30 percent greater than the average for all 1,337 cases.

Details not given in table 1 but concerning the complicating agent associated with the groups entering the classification used are of sufficient importance to be included here. Only those complicating agents will be noticed that are associated with 10 or more percent of the cases of a particular category. Of the 825 cases representing diseases resulting from accidental injuries, 196 (24 percent) are accounted for by arthritis, 154 (19 percent) by general infections, 98 (12 percent) by bone infections, 97 (12 percent) by eye cases materially aggravated by infections, and 83 (10 percent) by neuroses. Of the 293 cases under diseases activated or aggravated by accidental injuries, 120 (41 percent) are accounted for by arthritis, 59 (20 percent) by venereal diseases, and 28 (10 percent) by tuberculosis. Of the 16 cases representing dusts, gases, and chemicals, 5 are associated with lead and 4 with tuberculosis.

Table 1 shows, moreover, that the partially disabled include 953 cases, or 71 percent of the total; those totally disabled include 384 cases, or 29 percent. The total duration of cases and the total compensation paid for all cases, respectively, are, however, similar in magnitude for both groups of disability. The average compensation paid per partially disabled case is generally less than the average paid

City reports for week ended Dec. 12, 1936—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Iowa:											
Cedar Rapids	0	------	-------	0	-------	1	0	-------	0	3	-------
Davenport	0	------	-------	0	-------	1	0	-------	0	0	-------
Des Moines	0	------	-------	0	-------	15	0	-------	0	0	47
Sioux City	0	------	-------	0	-------	13	3	-------	0	0	-------
Waterloo	2	------	-------	0	-------	2	0	-------	0	10	-------
Missouri:											
Kansas City	2	------	2	2	7	27	0	3	0	10	94
St. Joseph	-------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------
St. Louis	13	------	0	1	11	35	0	10	2	34	224
North Dakota:											
Fargo	0	------	0	0	1	3	0	0	0	0	11
Grand Forks	0	------	-------	0	-------	0	0	-------	0	0	-------
Minot	0	------	0	0	0	0	0	0	0	0	9
South Dakota:											
Aberdeen	0	------	-------	0	-------	1	0	-------	0	0	-------
Nebraska:											
Omaha	0	------	0	1	8	5	0	0	0	1	54
Kansas:											
Lawrence	0	2	-------	0	0	1	0	0	0	0	7
Topeka	0	------	1	1	5	4	0	1	0	0	36
Wichita	0	------	0	0	9	5	0	1	0	0	34
Delaware:											
Wilmington	0	------	0	18	2	1	0	0	0	1	29
Maryland:											
Baltimore	3	8	0	96	29	21	0	14	1	124	221
Cumberland	0	1	0	1	3	0	0	0	1	0	20
Frederick	0	------	0	0	0	1	0	1	0	0	4
District of Columbia:											
Washington	5	2	2	1	22	10	0	12	1	31	189
Virginia:											
Lynchburg	0	------	0	1	1	1	0	2	0	0	20
Norfolk	0	3	0	1	2	5	0	1	0	0	21
Richmond	1	------	1	0	11	1	0	3	1	0	79
Roanoke	1	------	0	0	2	2	0	0	0	0	20
West Virginia:											
Charleston	0	------	0	0	1	0	0	0	0	0	23
Huntington	1	------	-------	0	-------	3	0	-------	0	0	-------
Wheeling	0	------	0	0	10	1	0	0	0	0	29
North Carolina:											
Gastonia	0	------	-------	0	-------	0	0	-------	0	0	-------
Raleigh	0	------	0	0	4	1	0	0	0	0	29
Wilmington	0	------	0	0	2	0	0	0	0	0	8
Winston-Salem	1	------	0	0	2	2	0	1	0	0	13
South Carolina:											
Charleston	1	26	0	0	7	3	0	3	0	0	27
Columbia	0	------	0	0	8	0	0	0	0	0	24
Florence	1	------	0	0	0	0	0	1	0	0	8
Greenville	1	------	0	0	5	1	0	0	0	0	15
Georgia:											
Atlanta	1	22	6	0	18	11	0	2	0	0	110
Brunswick	-------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Savannah	0	90	5	0	6	0	0	0	0	2	56
Florida:											
Miami	0	------	0	1	1	0	0	2	0	0	29
Tampa	0	4	4	1	6	0	0	1	0	0	30
Kentucky:											
Ashland	0	------	-------	0	-------	0	0	-------	0	0	-------
Covington	0	------	0	0	3	1	0	1	0	0	20
Lexington	0	2	0	0	2	0	0	3	0	0	25
Tennessee:											
Knoxville	3	------	1	0	5	0	0	0	0	0	29
Memphis	1	------	0	0	5	8	0	4	0	7	96
Nashville	1	------	1	0	6	4	0	4	0	0	62
Alabama:											
Birmingham	1	10	0	1	12	3	0	5	1	1	85
Mobile	0	------	3	0	0	5	0	0	0	0	25
Montgomery	2	------	-------	0	-------	5	0	-------	0	1	-------
Arkansas:											
Fort Smith	1	------	-------	0	-------	3	0	-------	0	0	-------
Little Rock	0	------	0	0	7	0	0	1	0	0	8

City reports for week ended Dec. 12, 1936—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
Lake Charles	0	------	0	0	1	0	0	0	0	0	2
New Orleans	1	5	4	1	32	0	0	10	2	0	160
Shreveport	0	------	0	0	10	1	0	2	0	0	51
Oklahoma:											
Oklahoma City	2	------	1	0	5	4	0	2	1	0	37
Tulsa	0	------	------	1	------	2	0	------	0	0	------
Texas:											
Dallas	6	3	3	1	9	14	0	1	0	2	64
Fort Worth	3	5	0	24	1	5	1	1	0	5	41
Galveston	0	------	0	0	2	0	0	0	0	0	14
Houston	3	------	1	0	9	4	0	4	0	0	86
San Antonio	2	------	1	0	12	0	0	9	0	0	73
Montana:											
Billings	0	------	0	1	1	2	0	0	0	0	11
Great Falls	0	------	0	0	1	0	3	0	0	0	7
Helena	0	------	0	0	2	3	0	0	0	0	7
Missoula	0	------	0	0	1	0	0	0	0	0	4
Idaho: Boise	0	------	0	0	1	3	0	0	0	0	11
Colorado:											
Colorado Springs	0	------	0	0	3	1	0	0	0	0	13
Denver	4	------	0	4	5	20	0	7	0	43	91
Pueblo	1	------	0	0	1	1	0	0	0	0	10
New Mexico: Albuquerque	0	------	0	2	3	7	0	6	0	0	19
Utah: Salt Lake City	0	------	0	2	7	13	0	3	0	5	44
Nevada: Reno	------	------	------	------	------	------	------	------	------	------	------
Washington:											
Seattle	6	------	0	4	12	5	0	5	0	1	108
Spokane	0	------	0	0	7	7	0	0	2	0	37
Tacoma	0	------	1	0	4	1	0	1	0	0	34
Oregon:											
Portland	0	------	2	2	9	6	1	2	0	7	82
Salem	0	------	------	0	------	1	0	------	0	8	------
California:											
Los Angeles	15	22	5	3	29	39	0	26	0	71	397
Sacramento	2	1	1	0	2	14	0	4	0	5	34
San Francisco	5	1	0	2	11	24	0	8	0	26	202

State and city	Meningococcus meningitis		Poliomyelitis cases	State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Delaware:			
Boston	2	1	0	Wilmington	1	0	0
Rhode Island:				Maryland:			
Providence	2	0	0	Baltimore	4	0	1
New York:				District of Columbia:			
New York	9	8	0	Washington	1	1	0
Pennsylvania:				Tennessee:			
Philadelphia	1	0	0	Knoxville	0	0	2
Reading	1	0	0	Memphis	1	0	1
Ohio:				Louisiana:			
Cincinnati	0	1	1	Lake Charles	1	0	0
Cleveland	0	0	1	Oklahoma:			
Columbus	0	0	1	Oklahoma City	2	0	0
Toledo	2	0	0	Oregon:			
Illinois:				Portland	2	0	0
Chicago	0	0	3	California:			
Michigan:				Los Angeles	1	1	3
Detroit	5	3	1				
Missouri:							
St. Louis	0	0	2				

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